

# NASA TECH BRIEF



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## Improved Process for Epitaxial Deposition of Silicon on Prediffused Substrates

It is frequently desirable to fabricate integrated circuits in a silicon layer epitaxially deposited on a silicon wafer in which a heavily doped sublayer pattern has been diffused. Either of two methods has been used for the epitaxial deposition of silicon. In one method the silicon source is silane ( $\text{SiH}_4$ ); in the other method, silicon tetrachloride ( $\text{SiCl}_4$ ) is the silicon source. The silane reaction, nonreversible decomposition at  $1000^\circ\text{C}$ , produces a silicon layer with a sharp junction. This junction is desirable, as out diffusion is minimized and the original sublayer pattern is undisturbed. However, depletion of the reaction gases results in a silicon layer of varying thickness and resistivity. The silicon chloride reaction, reduction with hydrogen at  $1150^\circ\text{C}$ , produces a silicon layer that is uniform in both thickness and resistivity. This reaction is reversible, however, releasing and re-depositing a sufficient amount of the diffused sublayer doping to obliterate the pattern.

A new process which has been developed will uniformly deposit silicon epitaxially on prediffused substrates without affecting the sublayer pattern. In this process, approximately 2 microns of silicon are first

deposited at  $1000^\circ\text{C}$  from a silane source. The temperature of the substrate is then raised to  $1150^\circ\text{C}$  and the rest of the required silicon layer is deposited from a silicon tetrachloride source. In this manner, the sublayer diffusion pattern is protected from the silicon tetrachloride reaction.

### Note:

Details may be obtained from:

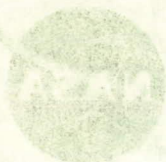
Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B68-10396

### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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M. G. Clarke, and J. C. Word  
of Westinghouse Electric Corporation  
under contract to  
Marshall Space Flight Center  
(MFS-14910)

Category 03



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## Improved Process for Control Electronics

A new process for the manufacture of control electronics has been developed by NASA's Langley Research Center. This process, known as the "Langley Process," is a modification of the standard process used for the manufacture of control electronics. It involves the use of a special type of material, known as "Langley material," which is a combination of a plastic and a metal. This material is used to form the base of the control electronics, and it is then coated with a thin layer of metal. This process results in a control electronics that is more reliable and more durable than the standard process.

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